

Class : X
Subject : MATHEMATICS

Max Marks:80
Time Allotted: 3 hrs

Instructions:

1. All questions are compulsory.
2. The question paper consists of 30 questions. Section – A comprises of 6 questions of 1 mark each, Section – B comprises of 6 questions of 2 marks each, Section – C comprises of 10 questions of 3 marks each and Section – D comprises of 8 questions of 4 marks each.
3. Use of calculator is not permitted.

Section – A

1. The decimal expansion of the rational number $\frac{43}{2^4 \cdot 5^3}$ will terminate after how many places of decimal?
2. If the product of the zeroes of the quadratic polynomial, $p(x) = (k - 2)x^2 - 4x + k$ is 3, find the value of k.
3. The nth term of an AP is $6n + 2$. Find its common difference.
4. PA and PB are tangents drawn from a point P to the circle with centre O. If $\angle APB = 60^\circ$, then what is $\angle AOB$?
5. Write the empirical relationship between the three measures of central tendency.
6. Two coins are tossed simultaneously. Find the probability of getting exactly one head.

Section – B

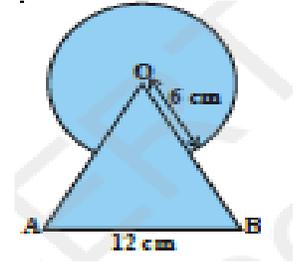
7. Prove that $\frac{3\sqrt{2}}{5}$ is an irrational number.
8. If α and β are the zeroes of the polynomial $3x^2 + 5x - 2$, then form a quadratic polynomial whose zeroes are 2α and 2β .
9. For what values of k will the following system of linear equations have no solutions
 $3x + y = 1$; $(2k - 1)x + (k - 1)y = 2k + 1$.
10. Find the value of x for which the distance between the points P(4, - 5) and Q(12, x) is 10 units.
11. If A, B, C are interior angles of ΔABC , then show that: $\cos\left(\frac{B+C}{2}\right) = \sin\frac{A}{2}$.
12. If the mean of the following frequency distribution is 54, find the value of p.

Class	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
Frequency	7	p	10	9	13

Section – C

13. Find the largest positive integer that will divide 398, 436 and 542 leaving remainders 7, 11 and 15 respectively.
14. Solve for x: $\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}$ ($x \neq -1, -2, -4$)
15. How many multiples of 4 lie between 10 and 250? Also find their sum.
16. In ΔABC , if AD is the median, then show that $AB^2 + AC^2 = 2[AD^2 + BD^2]$
17. Prove that the tangent drawn at the mid-point of an arc of a circle is parallel to the chord joining the end points of the arc.
18. Evaluate: $\frac{\sin 39^\circ}{\cos 51^\circ} + 2 \tan 11^\circ \tan 31^\circ \tan 45^\circ \tan 59^\circ \tan 79^\circ - 3(\sin^2 21^\circ + \sin^2 69^\circ)$.

19. The angles of depressions of two ships from the top of a lighthouse are found to be 45° and 30° . If the ships are 200 m apart, find the height of the lighthouse.
20. A card is drawn at random from a well shuffled pack of 52 cards. Find the probability of getting:
- a non-face card.
 - a jack of diamond.
 - a black king or a red queen
21. The difference between the outer and inner curved surface area of a hollow right circular cylinder, 14 cm long is 88 cm^2 . If the volume of metal used in making the cylinder is 176 cm^3 , find the outer and inner diameters of the cylinder.
22. Find the area of the shaded region in the figure, where a circular arc of radius 6 cm has been drawn with vertex O of an equilateral triangle OAB of side 12 cm as centre.



Section – D

23. A person travels 600 km partly by train and partly by car. If he covers 400 km by train and the rest by car, it takes 6 hours and 30 minutes. But if he travels 200 km by train and the rest by car, he takes half an hour longer. Find the speed of the car and that of the train.
24. ₹6500 were divided equally among a certain number of persons. Had there been 15 more persons, each would have got ₹30 less. Find the original number of persons.
25. Find the area of the triangle formed by joining the midpoints of the sides of the triangle whose vertices are A(2,1), B(4,3) and C(2,5).
26. In an equilateral triangle $\triangle ABC$, D is a point on BC such that $BD = \frac{1}{3}BC$. Prove that $9AD^2 = 7AB^2$
27. Draw a line segment of length 7 cm. Taking A as centre draw a circle of radius 3 cm and taking B as centre draw another circle of radius 2.5 cm. Construct tangents to each circle from the centre of the other circle.
28. A man standing on the deck of a ship, which is 16 m above the water level, observes the angle of elevation of the top of a cliff as 60° and the angle of depression of the base of the cliff as 30° . Calculate the distance of the cliff from the ship and the height of the cliff.
29. The following distribution represents the age of 35 females:

Age(in years)	0 – 15	15 – 30	30 – 45	45 – 60	60 – 75	75 – 90
No. of females	3	12	5	5	3	7

Draw a less than ogive for the given data. Hence obtain the median age from the graph and verify the result by using the formula.

30. A bucket of height 8 cm made up of copper sheet is in the form a frustum of a right circular cone with radii of its lower and upper ends as 3 cm and 9 cm respectively. Calculate:
- the height of the cone of which the bucket is a part.
 - the volume of water which can be filled in the bucket.
 - the area of a copper sheet required to make the bucket.